STRUCTURE OF MICROCARD

A01/1 = Structure of microcard

A03/1 = Special features, general instructions, safety measures, testers and tools, test specifications, tightening torques

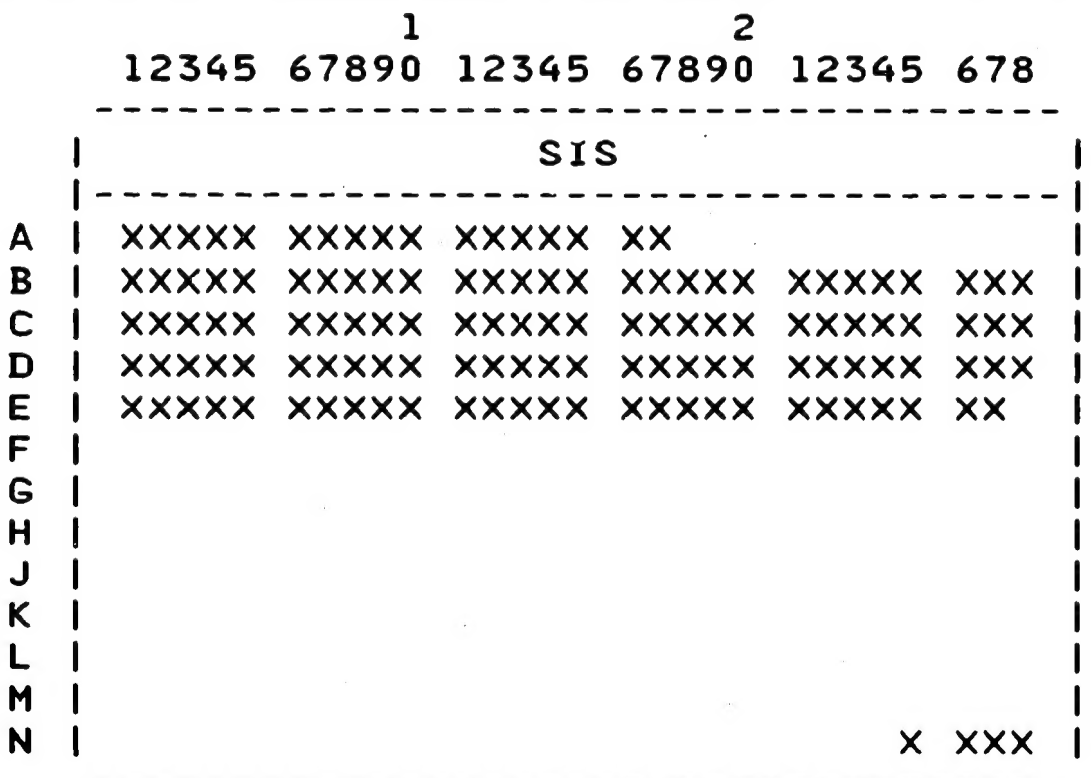
B01/1 = Repair

N25/1 = Index

N27/1 = Table of contents

N28/1 = Editorial note

Continue: A02/1 Fig.: A01/2



Continue: A02/1

STRUCTURE OF MICROCARD

The user prompting appears on every page, e.g.:
- Continue: B17/1
- Continue: B18/1 Fig.: B17/2

.../1 = Upper coordinate half
.../2 = Lower coordinate half

Continue: A03/1

SPECIAL FEATURES

These instructions describe the repair of in-line pumps of series P 10 without governor, LDA, timing device and supply pump.

The various governor types are to be disassembled and assembled in line with the respective repair instructions.

Continue: A03/2

SPECIAL FEATURES

Various modifications have been made to the P10 in order to comply with more stringent technical and quality requirements.

Changes to previous repair procedures are marked "P10-new" in these instructions.

Differences between P10-old and P10-new can only be seen from the technical changes to/in the pump, not however from the type designation or part number.

Continue: A04/1

SPECIAL FEATURES

The most important distinguishing features between P10-old and P10-new are listed in the following:

* Intermediate-bearing/camshaft screw connection
  P10-old: parallel
  P10-new: radial

* Delivery-valve assembly
  P10-old: Constant-volume valve (GRV)
  P10-new: Constant-pressure valve (GDV)

Continue: A04/2

SPECIAL FEATURES

* Pump barrel
  P10-old: Flat assembly flange
  P10-new: Assembly flange with shoulder for GDV

* Barrel/delivery-valve seal
  P10-old: 2 soft-iron rings
  P10-new: Serrated edge at delivery-valve holder

Improvements, for example in peak-to-valley height, are not visible.

Continue: A05/1

TEST SPECIFICATIONS

Leak test, suction gallery
* 10 minutes at 5 bar, then 1 minute pulsating 0 ... 5 bar.

Leak test, camshaft/spring/governor chamber
* 10 minutes at 1.5 bar, then 1 minute at 0.5 bar.

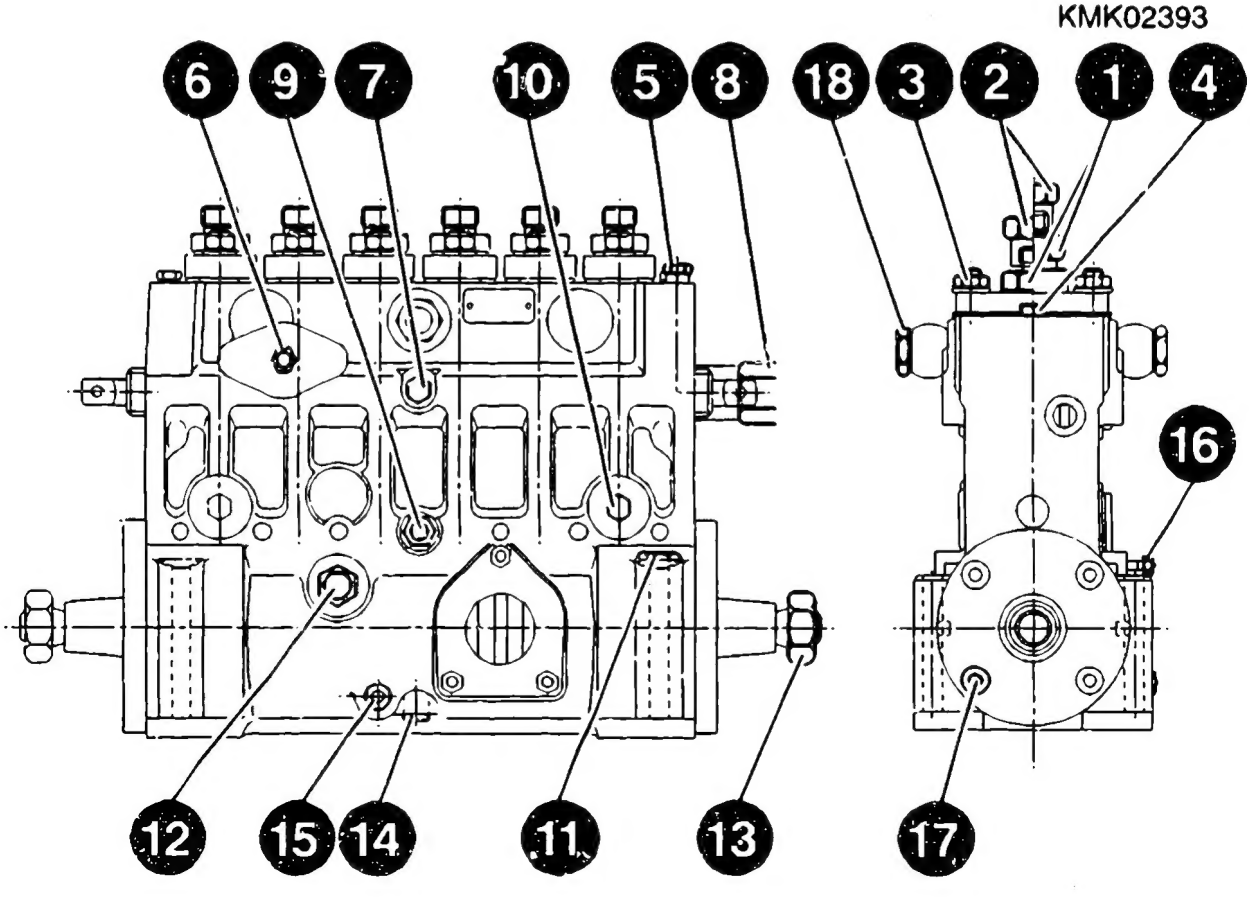
Continue: A06/1

TIGHTENING TORQUES

1 = Delivery-valve holder
P10-old M30x1
with flat-seal ring and serrated edge: 180...200-0-160...180 Nm
with flat-seal ring and beaded seal ring:
180...200-0-180...200-0-38...42 Nm
+ 20...21 further turn

Delivery-valve holder
P10-new M27x1.5
with no seal ring, however with two serrated edges: 160...180 Nm

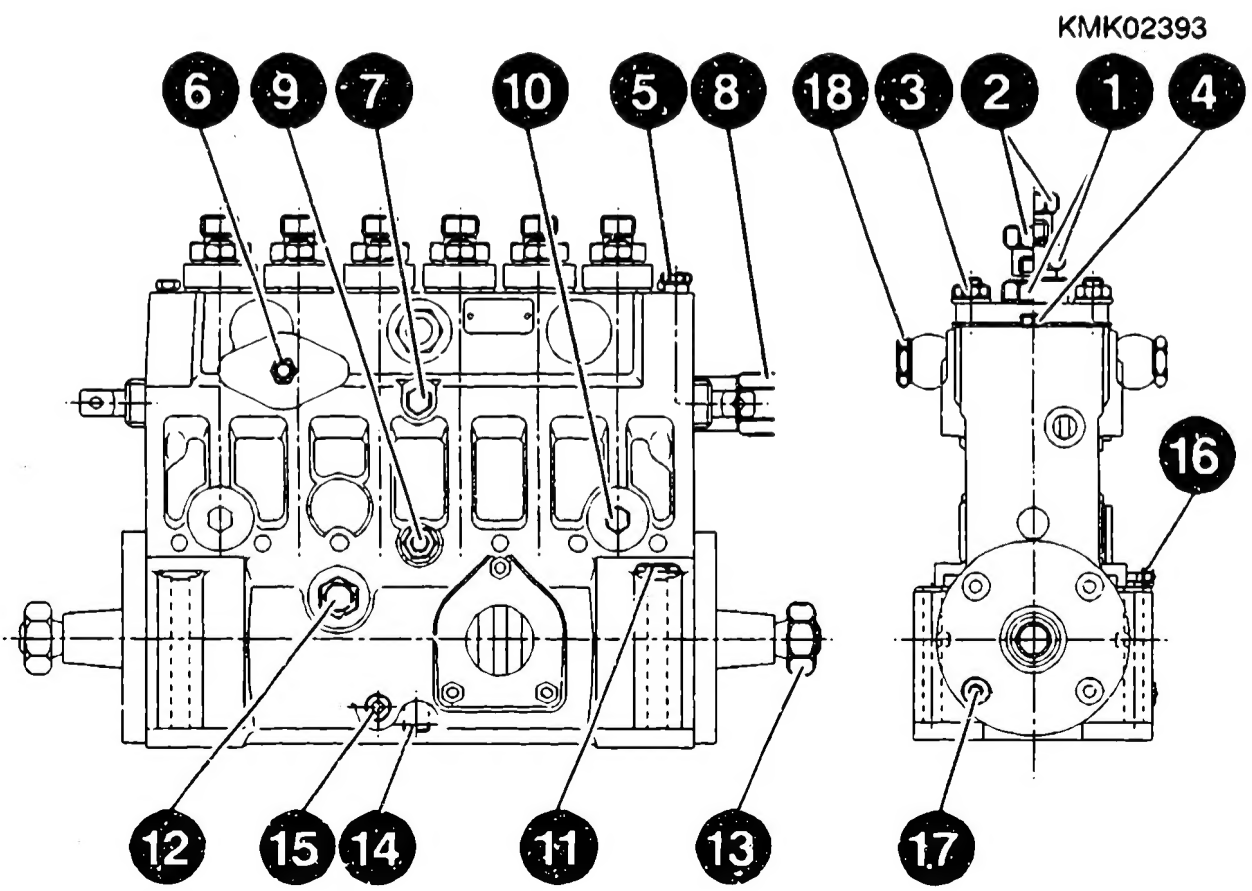
Continue: A07/1 Fig.: A06/2



TIGHTENING TORQUES

2 =	Union nut P10-old M18x1.5	38...45 Nm
	Union nut P10-new M22x1.5	50...60 Nm
3 =	Hexagon nut	51...58 Nm
4 =	Screw plug	5...7 Nm
5 =	Screw plug	5...7 Nm
6 =	Inlet union screw	max. 8 Nm
7 =	Hexagon bolt	8...11 Nm
8 =	Control-rod closure	max. 30 Nm
9 =	Hexagon bolt	max. 12 Nm

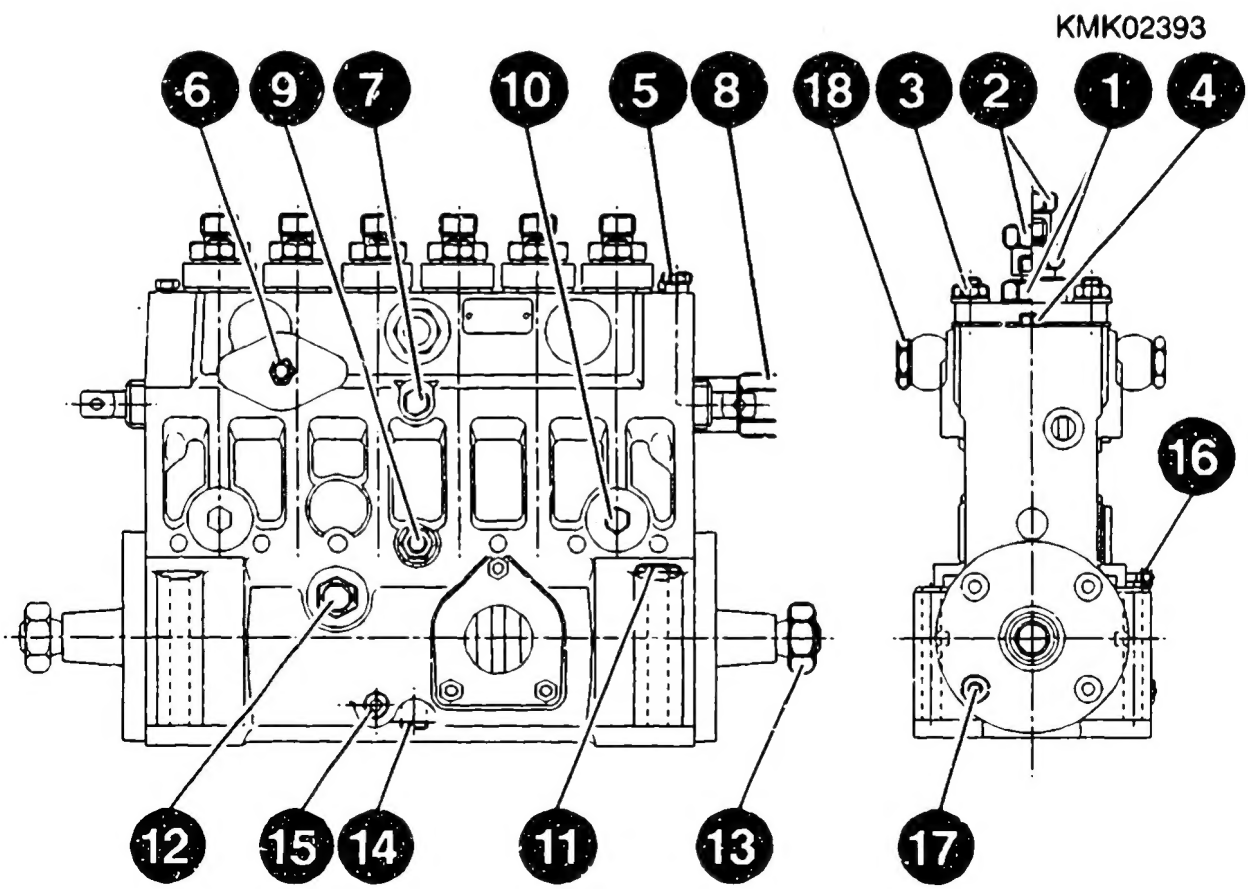
Continue: A08/1 Fig.: A07/2



TIGHTENING TORQUES

10=	Screw plug		30...50 Nm
11=	Hexagon bolt		25...35 Nm
12=	Screw connection	SW 19	max. 24 Nm
		SW 24	max. 42 Nm
13=	Couplings and timing device		
	Hexagon nut	SW 19	60...75 Nm
		SW 27	130...150 Nm
		SW 30	200...240 Nm
		SW 36	250...300 Nm

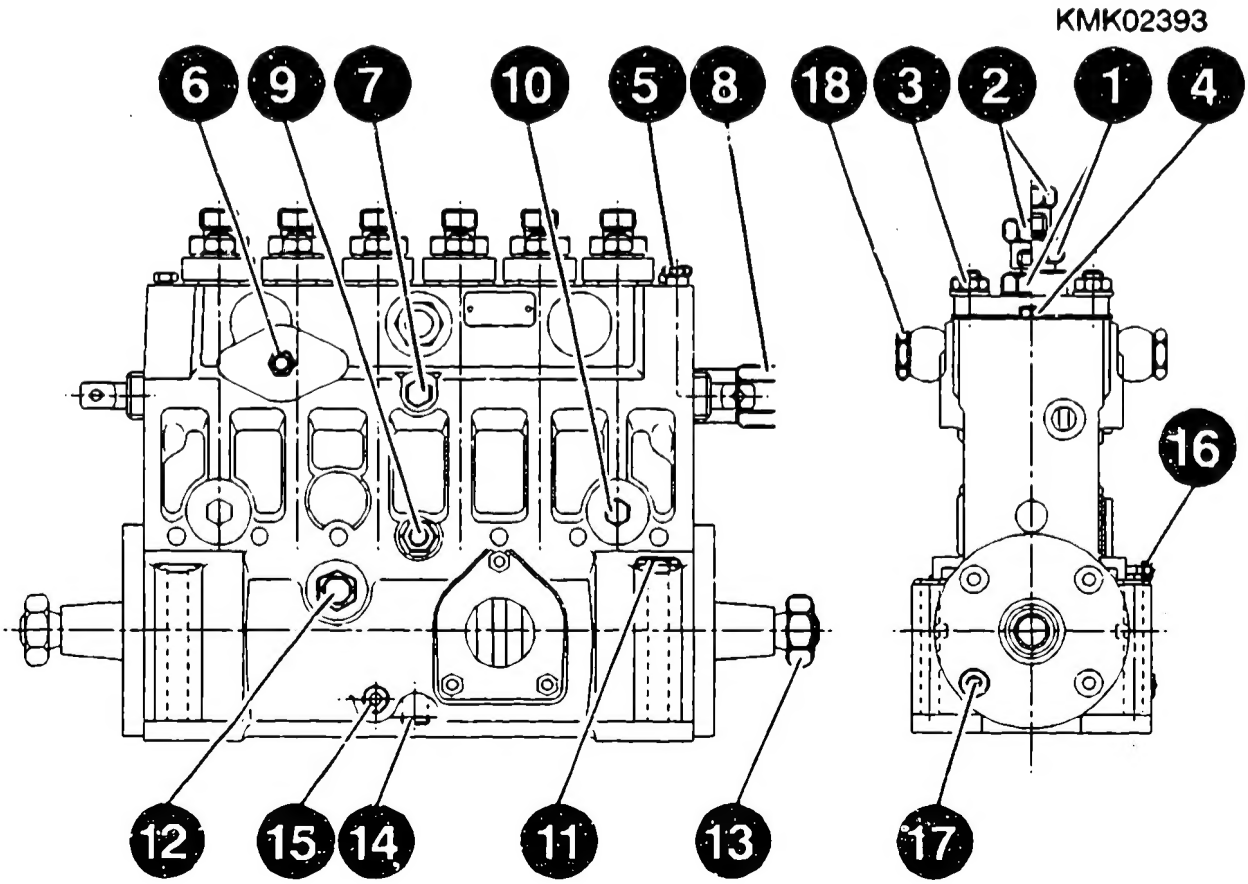
Continue: A09/1 Fig.: A08/2



TIGHTENING TORQUES

14=	Fillister-head screw for intermediate bearing		
	SW 6 with Cu seal ring 8x11.5x1 mm		14...16 Nm
	SW 5 with O-ring and washer		22...24 Nm
	SW 5 with Cu seal ring 8x13x1.5 mm		22...24 Nm
15=	Screw plug		14...16 Nm
16=	Hexagon nut		5...7 Nm
17=	Fillister-head screw		18...22 Nm
18=	Inlet-union screw	SW 19	max. 24 Nm
		SW 24	max. 42 Nm

Continue: A10/1 Fig.: A09/2



GENERAL

These repair instructions contain all repair operations for size "P 10" in-line pumps.

The various in-line pump versions are to be taken from the corresponding service-parts lists.

Scrap worn and damaged parts.

Continue: A10/2

GENERAL

When performing assembly, exclusive use is to be made of parts contained in the latest edition of the service-parts list.

Always renew sealing elements.

Rolling bearings are destroyed on removal and are therefore always to be renewed.

Continue: A11/1

GENERAL

Injection-pump components stored for lengthy periods are to be covered and protected against rusting by coating them with SHELL Ensisfluid SDC.

Wash out plunger-and-barrel assemblies/ delivery-valve assemblies in cleaning agent; moisten plungers with calibrating oil.

Rub over seal rings with lubricating oil SAE-30.

Continue: A12/1

CLEANING OF PARTS

Wash out parts in commercially available cleaning agent, such as chlorothene NU, which is not readily flammable.

Pay attention to the following safety regulations !!!

In Germany:
Order Governing Work with Combustible Liquids (Vbf) as published by Federal Labor Ministry (BmA).

Continue: A12/2

SAFETY MEASURES

Safety regulations for handling chlorinated hydrocarbons
Companies ZH 1 / 222
Employees ZH 1 / 129
as published by the Main Body of the Liability Insurance Associations (Central Association for Accident Prevention and Industrial Medicine)) Langwartweg 103, 53129 Bonn.

In all other countries attention is to be paid to the corresponding local regulations.

Continue: A13/1

TOOLS AND FIXTURES

* Clamping support	0 986 611 248 KDEP 2919
* Clamping pieces	0 986 611 475 KDEP 2998
* Extractor	0 986 612 367 KDEP 1749
* Disassembly mandrel	0 986 612 376 KDEP 1752
* Assembly tool	0 986 612 377 KDEP 1753
* Mounting sleeve	0 986 612 384 KDEP 1754
* Mounting plate	0 986 612 385 KDEP 1755

Continue: A13/2

TOOLS AND FIXTURES

* Mounting sleeve	0 986 612 386 KDEP 1756
* Mounting sleeve	0 986 612 387 KDEP 1757
* Setting gauge	0 986 612 388 KDEP 1758
* Assembly mandrel	0 986 612 391 KDEP 1759
* Assembly hook	0 986 612 392 KDEP 1760
* Pressing-in ring	0 986 612 393 KDEP 1761
* Pressing-in tool	0 986 612 394 KDEP 1762

Continue: A14/1

TOOLS AND FIXTURES

* Pressing-off plate	0 986 612 134 KDEP 1580
* Axial-clearance measuring device (taper 30)	0 986 611 068 KDEP 2882
* Axial-clearance measuring device (taper 35)	0 986 611 087 KDEP 2889
* Angle gauge	0 986 612 408 KDEP 1766
* Holding wrench	0 986 612 071 KDEP 1555
* Plunger pliers	0 986 612 409 KDEP 1767
* Puller	0 986 612 405 KDEP 1763/10

Continue: A14/2

TOOLS AND FIXTURES

* Pressing-off plate	0 986 612 134 KDEP 1580
* Axial-clearance measuring device	0 986 611 092 KDEP 2890
* Rod and clamping piece	0 986 611 123 KDEP 2898
* Guide sleeve	0 986 612 065 KDEP 1552

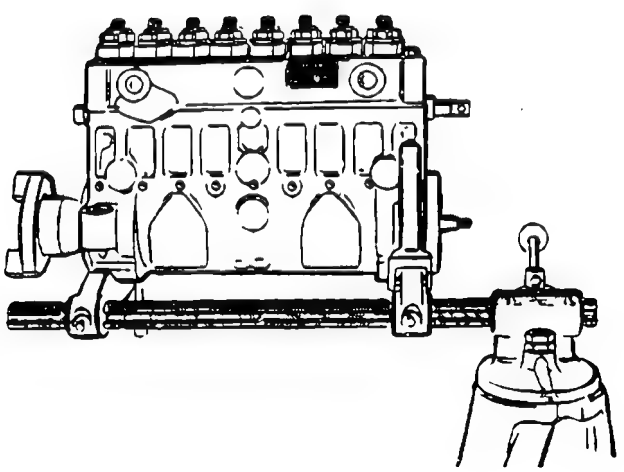
Continue: B01/1

DISMANTLING INJECTION PUMP

Clamp injection pump in position. To do so, depending on pump attachment, employ clamping support 0 986 611 248 (KDEP 2919) with appropriate rod and clamping parts 0 986 611 123 (KDEP 2898).
Attach coupling half to drive-end taper of camshaft. Detach supply pump.

Continue: B02/1 Fig.: B01/2

KMK02394

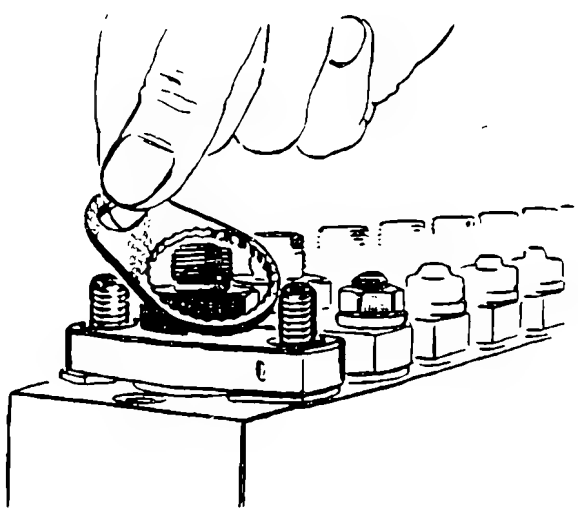


DISASSEMBLING INJECTION PUMP

Loosen and unscrew fastening nuts for plunger liners. Remove washers and positioning key.

Continue: B03/1 Fig.: B02/2

KMK02395



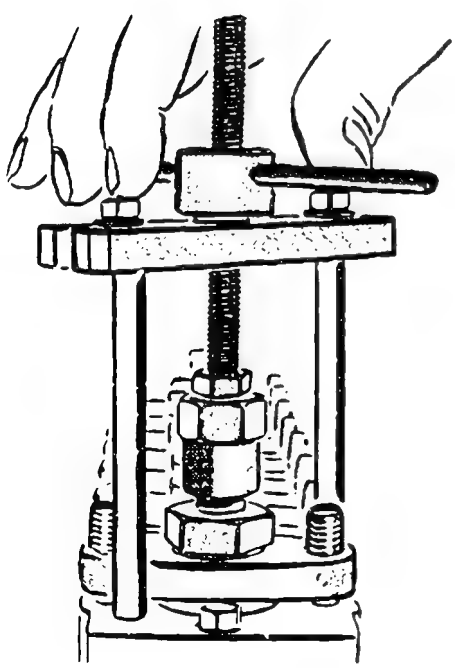
DISMANTLING INJECTION PUMP

Use screwdriver to raise plunger liners slightly. Remove pre-stroke shims beneath flange of plunger liners and set down in pairs. Then use puller 0 986 612 405 (KDEP 1763/10) to take plunger liners out of pump housing and set down in correct sequence.

Unfasten and screw off control-rod closure cap.

Continue: B04/1 Fig.: B03/2

KMK02396

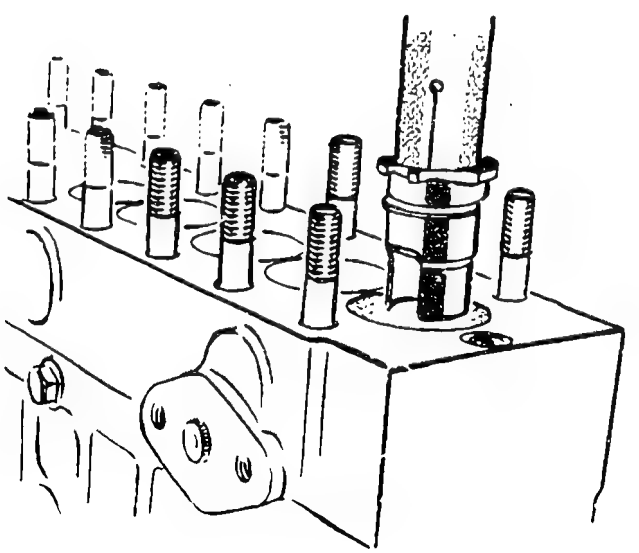


DISMANTLING INJECTION PUMP

Insert assembly tool 0 986 612 384 (KDEP 1754) by way of pump plunger into regulating sleeve. Press regulating sleeve slightly to rear (away from control rod) and guide out of control rod. Lift regulating sleeve out of pump housing and set down.

Continue: B05/1 Fig.: B04/2

KMK02397

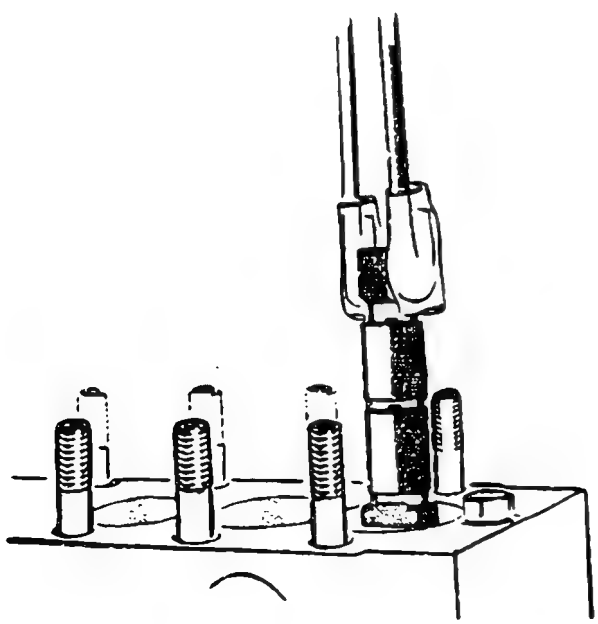


DISMANTLING INJECTION PUMP

Turn pump plunger with plunger pliers 0 986 612 409 (KDEP 1767) until it can be disengaged from roller tappet. Lift out pump plunger.

Continue: B06/1 Fig.: B05/2

KMK02398

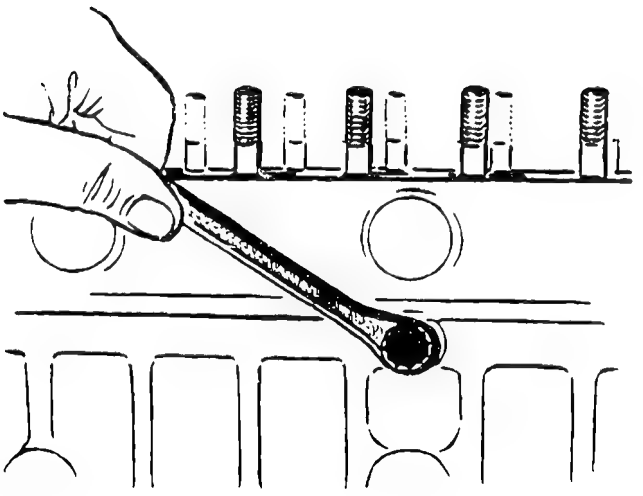


DISASSEMBLING INJECTION PUMP

Loosen and screw out control-rod guide bolt. Remove Loctite from threads.

Continue: B07/1 Fig.: B06/2

KMK02399



DISASSEMBLING INJECTION PUMP

Remove control rod.

Continue: B08/1

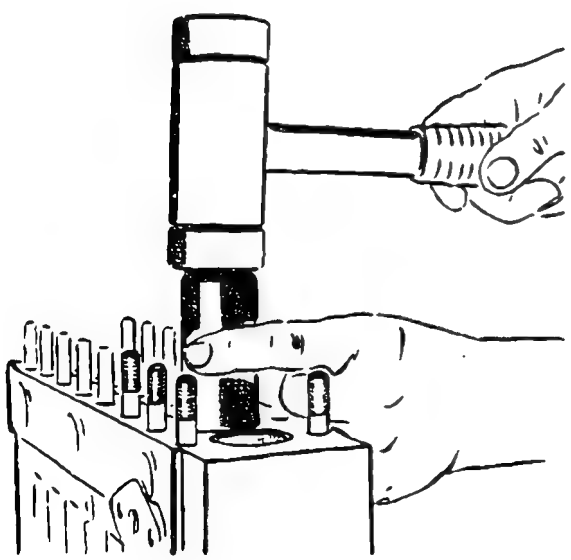
DISMANTLING INJECTION PUMP

Insert disassembly mandrel 0 986 612 376 (KDEP 1752) into housing bores of assemblies and position on spring seat. Unfasten snap ring from housing in BDC position of roller tappet by tapping on disassembly mandrel with hammer. Pull out disassembly mandrel, remove snap ring and detach upper spring seat.

Attention: Spring is pre-tensioned. Hold disassembly mandrel 0 986 612 376 (KDEP 1752) firmly.

Continue: B09/1 Fig.: B08/2

KMK02400

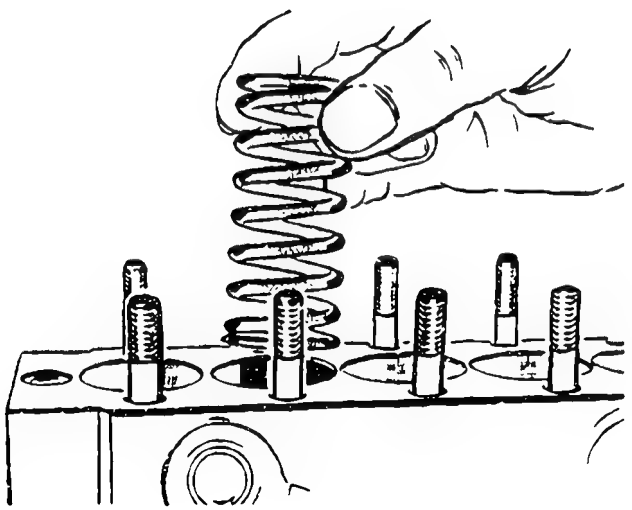


DISASSEMBLING INJECTION PUMP

Remove plunger return spring.

Continue: B10/1 Fig.: B09/2

KMK02401

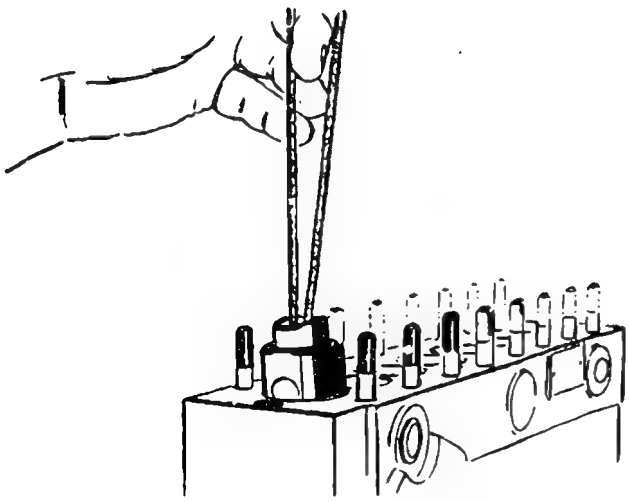


DISMANTLING INJECTION PUMP

Insert assembly hook 0 986 612 392 (KDEP 1760) into recess for bottom of plunger in roller tappet and pull roller tappet upwards out of pump housing.

Continue: B11/1 Fig.: B10/2

KMK02402



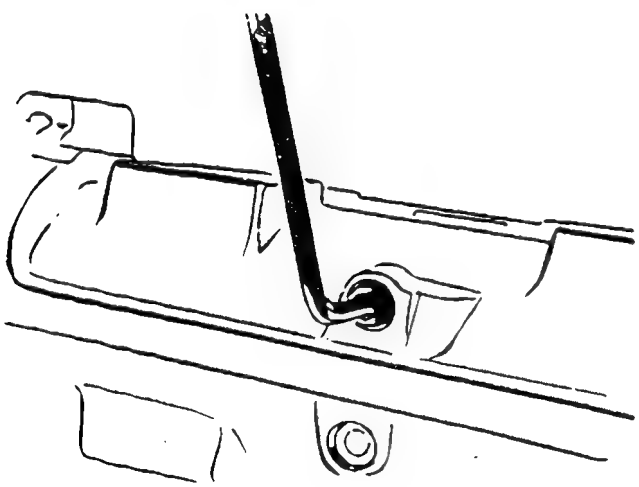
DISASSEMBLING INJECTION PUMP

Loosen and screw out fastening screws for intermediate bearing.
Note: These screws are coated with Loctite. Remove Loctite from screws and tapped holes.

Remove seal rings from pump housing.

Continue: B12/1 Fig.: B11/2

KMK02436



DISASSEMBLING INJECTION PUMP

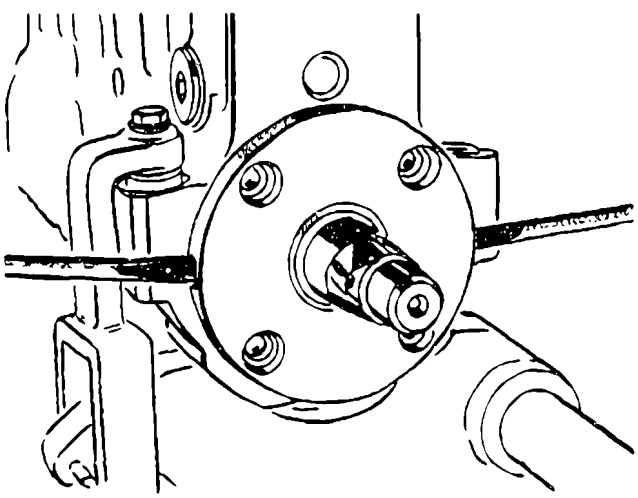
Remove coupling half from camshaft.

To protect radial-lip-type oil seal in bearing end plate, wind some insulating tape around the drive taper of the camshaft in the area of the driver pin.

Loosen and screw out fastening screws for bearing end plate. Use two screwdrivers to lever bearing end plate out of pump housing.

Continue: B13/1 Fig.: B12/2

KMK02403



DISASSEMBLING INJECTION PUMP

Remove camshaft from pump housing. Pay attention to intermediate bearing.

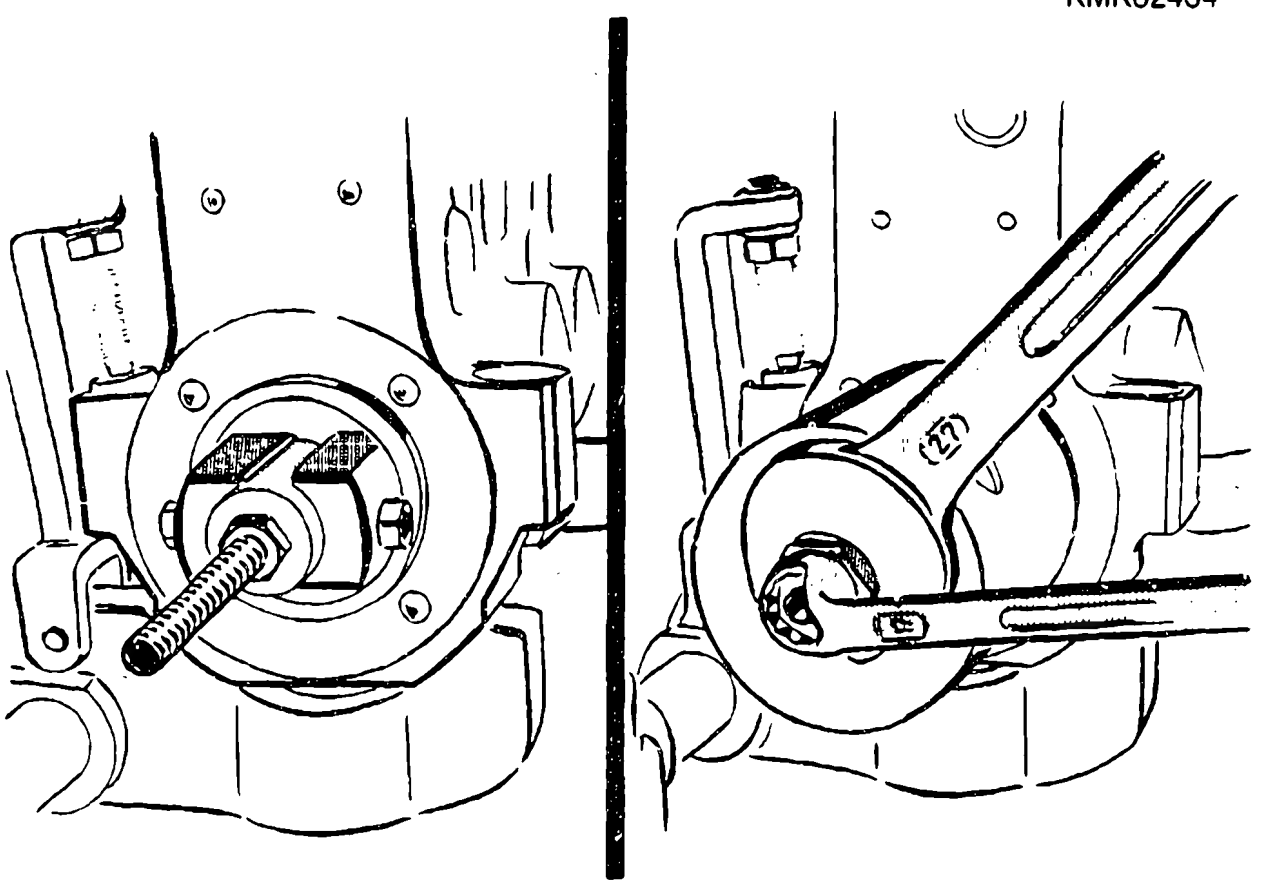
Continue: B14/1

DISMANTLING INJECTION PUMP

Use extractor 0 986 612 367 (KDEP 1749) to pull bearing outer race out of pump housing.

Continue: B15/1 Fig.: B14/2

KMK02404

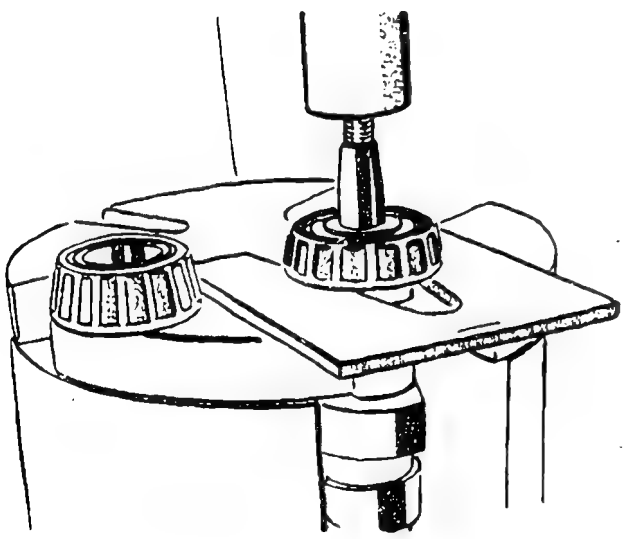


DISMANTLING INJECTION PUMP

Pull inner races of taper roller bearings of camshaft off camshaft on mandrel press. To do so, insert pressing-off plate 0 986 612 134 (KDEP 1580) between bearing inner race and camshaft shoulder and position pressing-off plate on mandrel press. Press camshaft downwards out of bearing.
Attention: Taper roller bearings are destroyed in the process and cannot be re-used.

Continue: B16/1 Fig.: B15/2

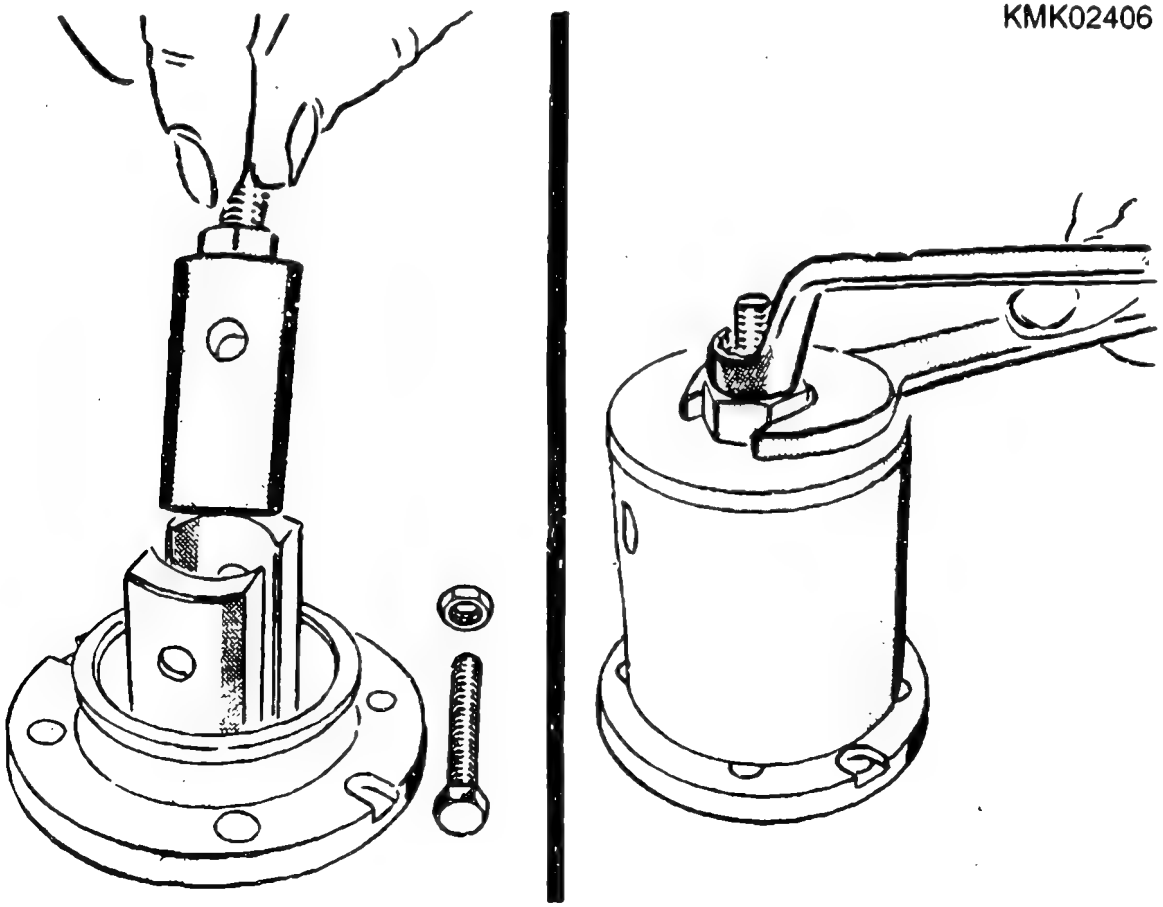
KMK02405



DISMANTLING INJECTION PUMP

Use extractor 0 986 612 367 (KDEP 1749) to pull bearing outer race out of drive-end bearing end plate. To do so, insert clamping part of extractor between outer bearing and shoulder in bearing end plate. Bearing outer race is destroyed in the process and is to be scrapped.

Continue: B17/1 Fig.: B16/2



DISMANTLING INJECTION PUMP

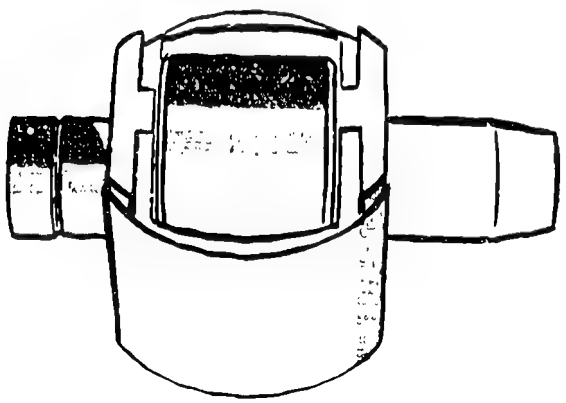
Dismantling roller tappet:

Position assembly mandrel 0 986 612 391 (KDEP 1759) on one end face of roller pin and knock roller pin out of roller tappet by tapping gently with rubber-headed hammer.
Important: Roller pin can only be knocked out to one side.

Set down roller pin. Remove remaining parts, namely roller, bushing and snap ring, from roller tappet shell and lay aside.

Continue: B18/1 Fig.: B17/2

KMK02407



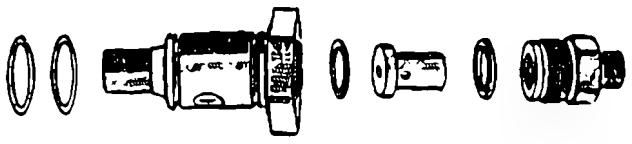
DISMANTLING INJECTION PUMP

Dismantling barrel-and-valve assembly:

Clamp mounting plate 0 986 612 385 (KDEP 1755) in vice. Remove both O-rings from assembly cylinder. Insert barrel-and-valve assembly into mounting plate 0 986 612 385 (KDEP 1755). Unfasten and screw out delivery-valve holder. Remove and set down individual components. Detach O-ring from delivery-valve holder. Attention: Delivery-valve assembly cannot be repaired. It is to be replaced as a complete unit.

Continue: B19/1 Fig.: B18/2

KMK02408



CLEANING OF PARTS

Wash out parts in commercially available cleaning agent, such as chlorothene NU, which is not readily flammable.

Pay attention to the following safety regulations !!!

In Germany:
Order Governing Work with Combustible Liquids (Vbf) as published by Federal Labor Ministry (BmA).

Continue: B19/2

SAFETY MEASURES

Safety regulations for handling chlorinated hydrocarbons

Companies	ZH 1 / 222
Employees	ZH 1 / 129

as published by the Main Body of the Liability Insurance Associations (Central Association for Accident Prevention and Industrial Medicine) Langwartweg 103, 53129 Bonn.

In all other countries, attention is to be paid to the corresponding local regulations.

Continue: B20/1

CLEANING COMPONENTS

Recut tapped fastening holes in pump housing for intermediate bearing and governor housing with tap; wash out and blow out.

Remove residual varnish on contact surface of plunger-and-barrel assembly and on sealing surfaces of housing. Completely remove residual paint from prestroke shims.

Continue: B21/1

COMPONENT CHECKING - WEAR ASSESSMENT

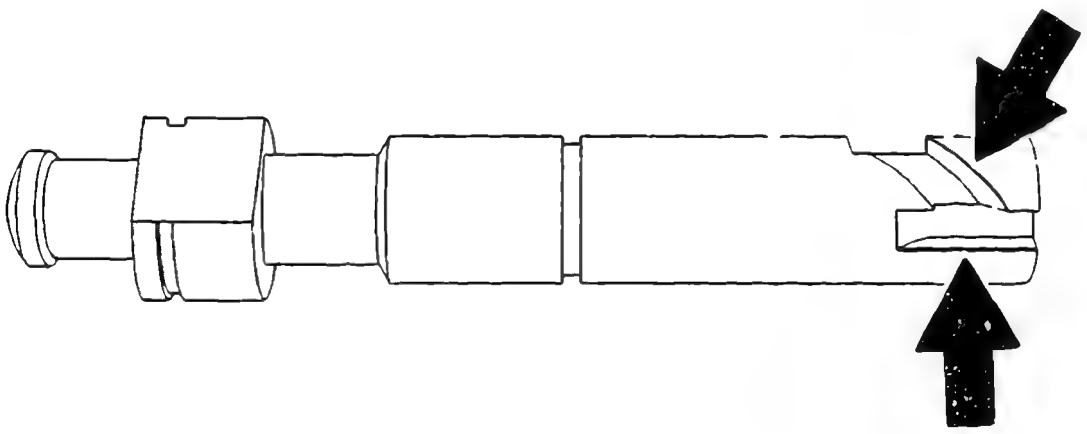
Renew worn or damaged parts.

Always renew gaskets and O-rings.

Pay particular attention to helices of pump plungers. The helices must have sharp edges and must not be rounded (arrow). The bearing surfaces must not reveal any signs of tracking or scoring.

Continue: B22/1 Fig.: B21/2

KMK01253



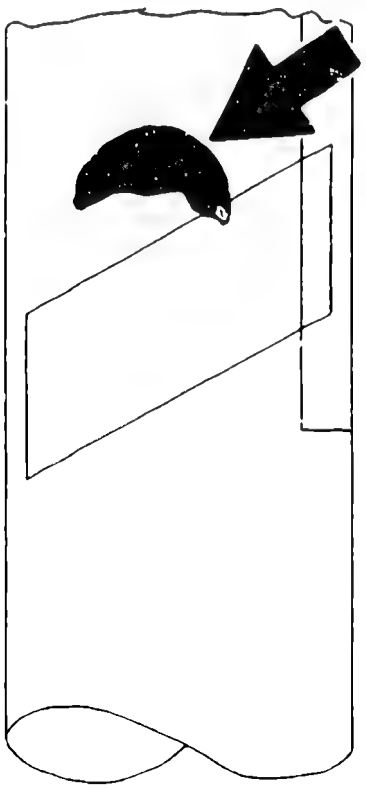
CHECKING INDIVIDUAL COMPONENTS - WEAR ASSESSMENT

Pay attention to the following instructions, so as to preclude any uncertainty as regards the assessment of plunger-and-barrel assemblies:

Renewal of the plunger-and-barrel assemblies is justified in the event of:
Cavitation in the area of the helices (arrow), plunger-and-barrel assembly seizure or sticking as a result of contamination or surface coating when subjected to slide test (plunger and barrel).

Continue: B23/1 Fig.: B22/2

KMK01254



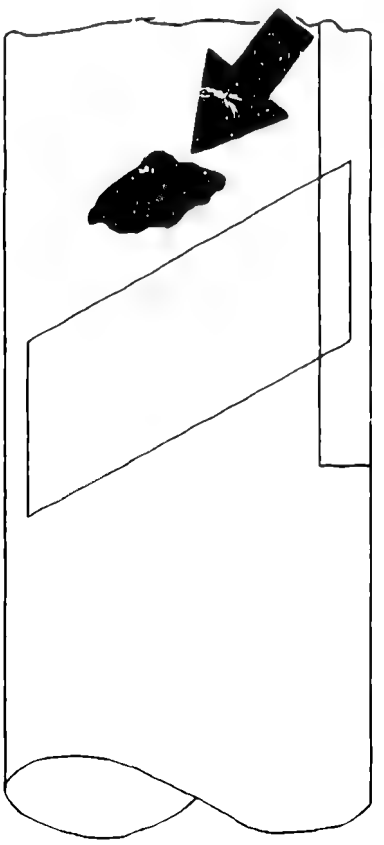
CHECKING INDIVIDUAL COMPONENTS - WEAR ASSESSMENT

Note:
Prior to testing, wash out pump plunger and plunger liner in clean calibrating oil. Hold pump plunger and plunger liner more or less vertical. The pump plunger must slide into the plunger liner by virtue of its own weight.

Renewal of the plunger-and-barrel assemblies is not justified in the event of:
Cavitation above the helix as far as helix (arrow).

Continue: B24/1 Fig.: B23/2

KMK01255



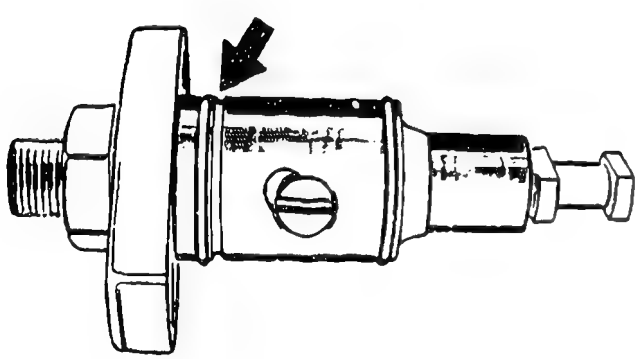
CHECKING INDIVIDUAL COMPONENTS - WEAR ASSESSMENT

Mat areas over entire periphery.
Bright areas (without scoring and mechanical wear).
Discoloration at plunger and plunger-and-barrel assembly liner as a result of residual fuel and lubricant, water in fuel or influence of temperature.

Plunger-and-barrel assemblies, the plunger liner of which only features the annular groove for accommodating the O-ring, are to be replaced with new plunger-and-barrel assemblies with additional ring recess (arrow) at relief bore.

Continue: B25/1 Fig.: B24/2

KMK02412



CHECKING INDIVIDUAL COMPONENTS - WEAR ASSESSMENT

The sealing surface of the plunger liner must additionally have been finely turned so as to be bright.

Note:

When performing repairs, a general rule is that plunger-and-barrel assemblies and delivery-valve assemblies should not be replaced individually. Exceptions are only possible after a relatively short period of operation.

Checking delivery-valve assemblies:

Continue: B25/2

CHECKING INDIVIDUAL COMPONENTS - WEAR ASSESSMENT

The sealing surface of the delivery-valve assembly must not be dented, subject to cavitation or unevenly worn.

Checking camshaft:

If the camshaft shows signs of severe tracking or if the tapers are damaged, the camshaft is to be renewed.

Intermediate bearings with traces of tracking are to be replaced.

Continue: B26/1

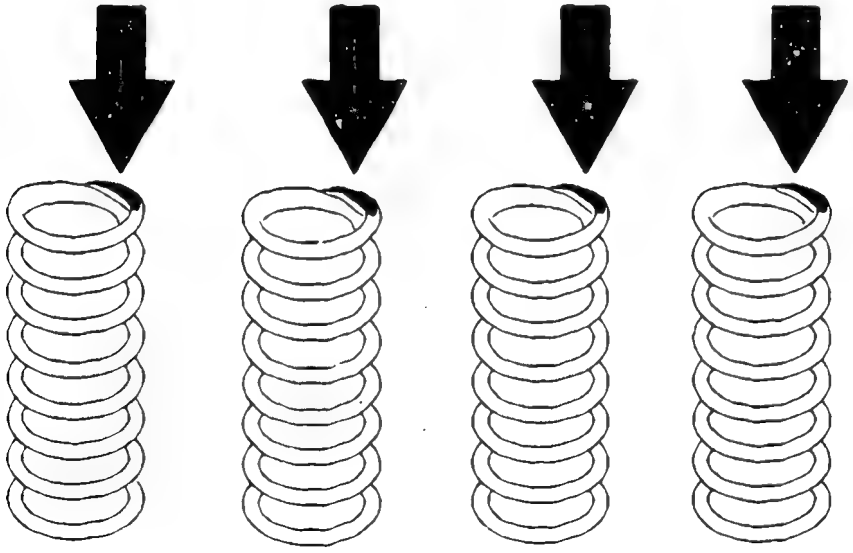
CHECKING INDIVIDUAL COMPONENTS - WEAR ASSESSMENT

Plunger return springs which are corroded or where the surface is damaged must be replaced due to the danger of fracture. Particular attention is to be paid to the area of the 1st winding.

Check pump housing for traces of wear. Be particularly on the look out for wear in the area of the tappet guide both in the bore and at the centering pins.

Continue: C01/1 Fig.: B26/2

KMK01259



ASSEMBLING INJECTION PUMP

Check freedom of movement of back-flow restrictor in delivery-valve holder. To do so, press several times from inside against the back-flow restrictor with the shank of a 2.5 mm dia. twist drill. Movement of the back-flow restrictor must be felt. Visual inspection must reveal that through-hole is free.

Clamp pump housing in position. Use clamping support 0 986 611 248 (KDEP 2919) with appropriate rod and clamping parts 0 986 611 123 (KDEP 2898).

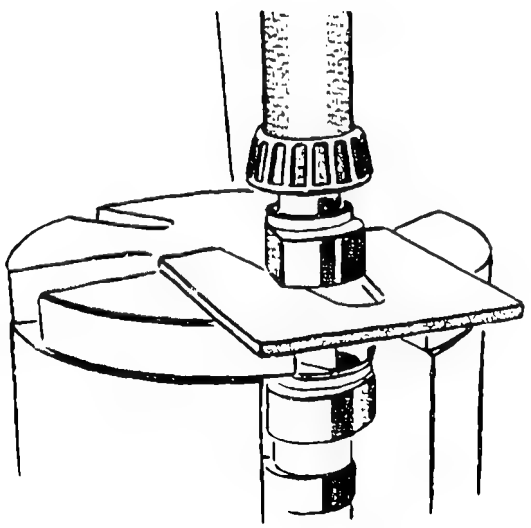
Continue: C02/1

ASSEMBLING INJECTION PUMP

Slip pressing-off plate 0 986 612 134 (KDEP 1580) beneath outermost cam of camshaft and position on mandrel press. Depending on thread, press on new bearing inner races with guide sleeve 0 986 612 065 (KDEP 1552) or 0 986 612 394 (KDEP 1762).

Continue: C03/1 Fig.: C02/2

KMK02414



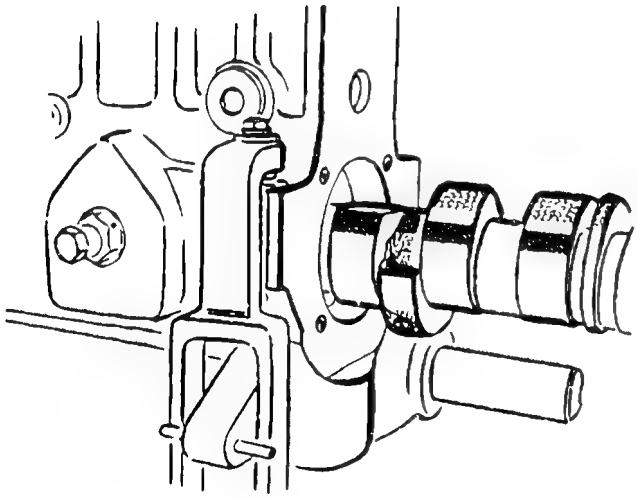
INJECTION PUMP ASSEMBLY

Press bearing outer race into pump housing into the bearing seat opposite the drive on mandrel press (small inside diameter first). Make sure no chips are scraped off housing.

Bond intermediate bearing into position on camshaft with grease. Insert camshaft into correct position in housing. Use acetone to brush out tapped holes in intermediate bearing for accommodating fastening screws.

Continue: C04/1 Fig.: C03/2

KMK02415



ASSEMBLING INJECTION PUMP

Coat intermediate-bearing bolts with Loctite 241.

Insert intermediate-bearing bolts into corresponding holes in pump housing but do not tighten.

Insert setting gauge 0 986 612 388 (KDEP 1758) from above into any assembly mounting hole and thus fix position of camshaft at arbitrary cam.

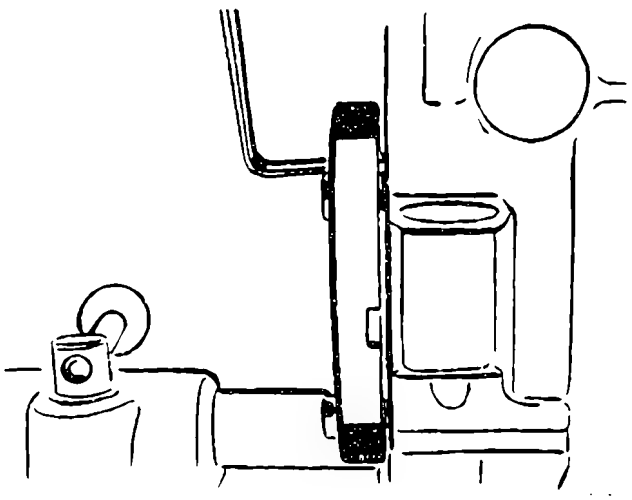
Continue: C05/1

INJECTION PUMP ASSEMBLY

Assemble bearing end plate opposite drive side without O-rings as far as contact with tapered-roller bearing. Use feeler gauge to measure distance between bearing end plate and pump housing. Remove bearing end plate again and add shims of appropriate thickness. Moisten O-rings for bearing end plate with motor oil SAE-30. Provide bearing end plate with prescribed O-rings and reassemble. Tighten fastening screws to 18...22 Nm.

Continue: C06/1 Fig.: C05/2

KMK02416



INJECTION PUMP ASSEMBLY

In order to determine the correct installation position of the camshaft, it can be held from the other side by hand.

Continue: C07/1

ASSEMBLING INJECTION PUMP

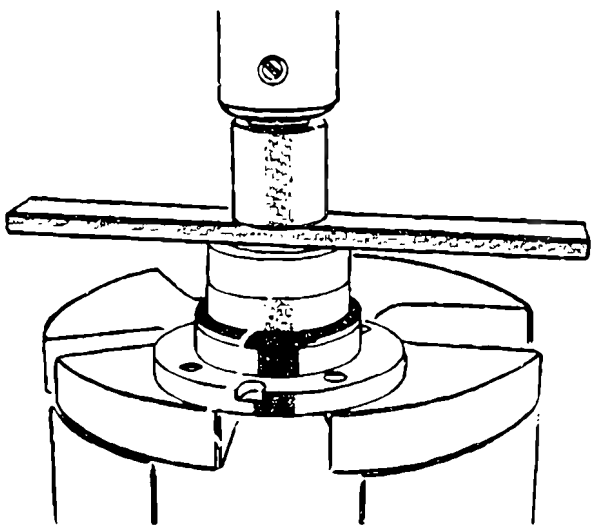
Position drive-end bearing end plate on plate of mandrel press. Insert appropriate bearing outer race (small diameter first) as far as possible and press home in bearing end plate using pressing-in ring 0 986 612 393 (KDEP 1761).

Attention: Do not as yet assemble radial lip-type oil seal and O-ring.

Insert bearing end plate into pump housing and temporarily fix with 2 bolts.

Continue: C08/1 Fig.: C07/2

KMK02417

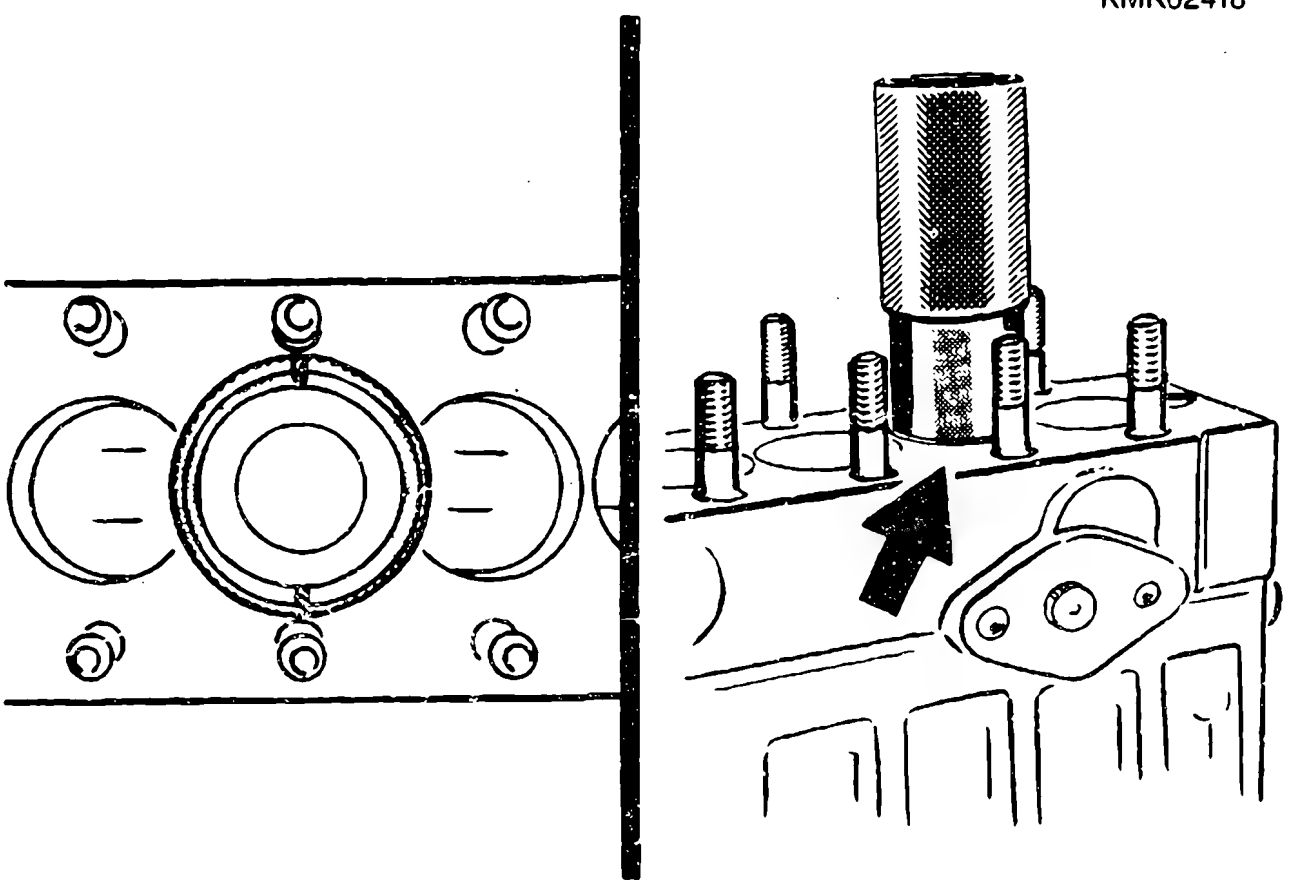


ASSEMBLING INJECTION PUMP

Turn camshaft until cam of no. 1 cylinder is in TDC position. To determine correct installation position of camshaft, insert setting gauge 0 986 612 388 (KDEP 1758) from above into assembly hole. Marks on upper edge of tool point towards studs for attaching assembly. The weight of the setting gauge should cause it to slip over the cam until red ring mark coincides with top edge of housing (arrow). This procedure is to be repeated for all cylinders.

Continue: C09/1 Fig.: C08/2

KMK02418



INJECTION PUMP ASSEMBLY

If the adjustment gauge can be inserted as far as the mark with at least 3 cams, the position of the camshaft in the pump housing is OK. If this is not the case, adjustment is to be performed by placing shims beneath the bearing end plate on the side opposite the drive.

Then reassemble bearing end plate together with prescribed O-rings. Tighten fastening screws to 18...22 Nm

Continue: C09/2

INJECTION PUMP ASSEMBLY

Following camshaft adjustment, tighten fastening screws for intermediate bearing. The tightening torque is as follows:

for SW 6 with CU seal ring	8x11.5x1 mm	14...16 Nm
for SW 5 with O-ring and	washer	22...24 Nm
for SW 5 with CU seal ring	8x13x1.5 mm	22...24 Nm

Continue: C10/1

INJECTION PUMP ASSEMBLY

Insert drive-end bearing end plate without O-ring and radial-lip-type oil seal into pump housing as far as it will go.

Use feeler gauge to measure distance between bearing end plate and pump housing. The dimension determined gives the thickness of the shims to be added. Place these shims on the bearing end plate and insert complete unit into pump housing.
Screw in fastening screws and tighten to tightening torque of 18...22 Nm.

Continue: C10/2

INJECTION PUMP ASSEMBLY

Use plastic hammer to tap several times from both sides on end faces of camshaft.

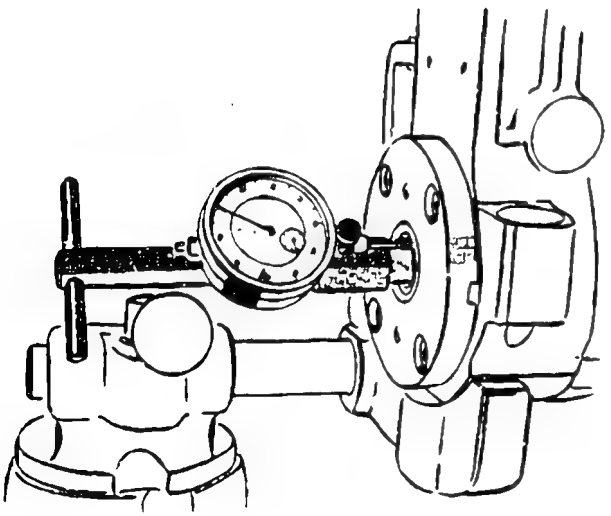
Continue: C11/1

ASSEMBLING INJECTION PUMP

Screw axial-clearance measuring device 0 986 611 092 (KDEP 2890) with dial indicator fitted onto taper opposite drive. Determine axial clearance of camshaft by turning camshaft and alternately pulling and pressing on axial-clearance measuring device.
Prescribed value: 0.05 mm
If the prescribed value does not coincide with the value determined, adjust axial clearance by selecting appropriate shims beneath drive-end bearing end plate.

Continue: C12/1 Fig.: C11/2

KMK02419



INJECTION PUMP ASSEMBLY

In order to obtain the prescribed initial tension, the bearing end plate is to be removed again and shims removed to a maximum of 0.1 mm.

Following correction, press radial-lip-type oil seal into drive-end bearing end plate. Moisten O-ring with commercially available motor oil SAE-30 and insert in ring groove in bearing end plate.

Continue: C12/2

INJECTION PUMP ASSEMBLY

Wind 2...3 layers of insulating tape around the driver pin and the drive taper of the camshaft to protect the radial-lip-type oil seal in the bearing end plate on the drive end.

Insert bearing end plate into pump housing and tighten all fastening screws. Tightening torque: 18...22 Nm.

Continue: C13/1

INJECTION PUMP ASSEMBLY

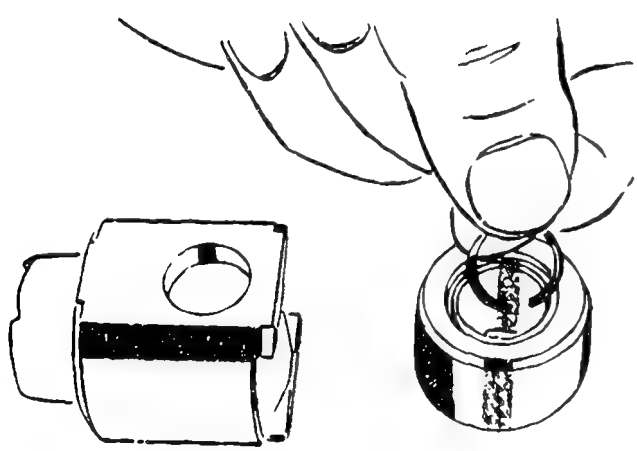
Assembly of roller tappet:

Moisten all parts prior to assembly with Molykote Multigliss.

Insert liner into tappet roller. Place snap ring on one end face of liner and insert complete assembly into roller-tappet shell.

Continue: C14/1 Fig.: C13/2

KMK02420

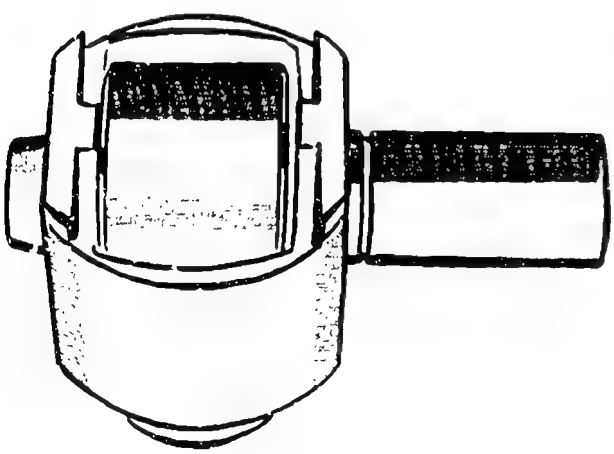


ASSEMBLING INJECTION PUMP

Starting from side away from snap ring, insert assembly pin 0 986 612 391 (KDEP 1759) into pin bore of roller tappet shell tapered end first. To spread snap ring, push it through until tapered part of assembly pin emerges on other side of roller tappet shell. Insert roller pin ring groove first into hole until contact is made with assembly pin.

Continue: C15/1 Fig.: C14/2

KMK02421



ASSEMBLING INJECTION PUMP

Give brief tap with plastic-headed hammer to knock in further until snap ring is felt to engage in ring groove of roller pin. Remove assembly mandrel 0 986 612 391 (KDEP 1759) from roller tappet.

Check:
Roller pin must then have slight axial play. Repeat procedure if this is not the case.

Continue: C16/1

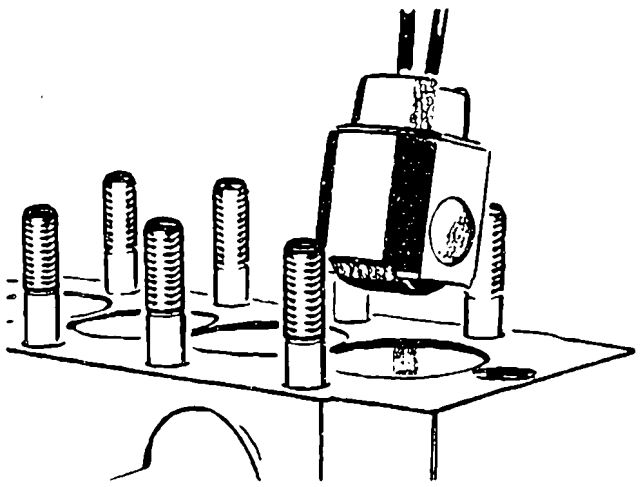
ASSEMBLING INJECTION PUMP

Moisten roller tappet with Molycote-Multigliss.

Carefully insert all roller tappets from above into holes in housing using assembly hook 0 986 612 392 (KDEP 1760) such that bearing surface of tappet roller makes contact with bearing surface of cam.

Continue: C17/1 Fig.: C16/2

KMK02422



INJECTION PUMP ASSEMBLY

After installing all roller tappets, rotate camshaft. In doing so, note whether all roller tappets likewise execute cam movement upwards and downwards. If this is not the case, the corresponding roller tappet is sticking.
The plunger-and-barrel bore in the housing and the roller tappet are then to be examined.

Damage to the housing or centering pins cannot be eliminated. The entire housing must be renewed.

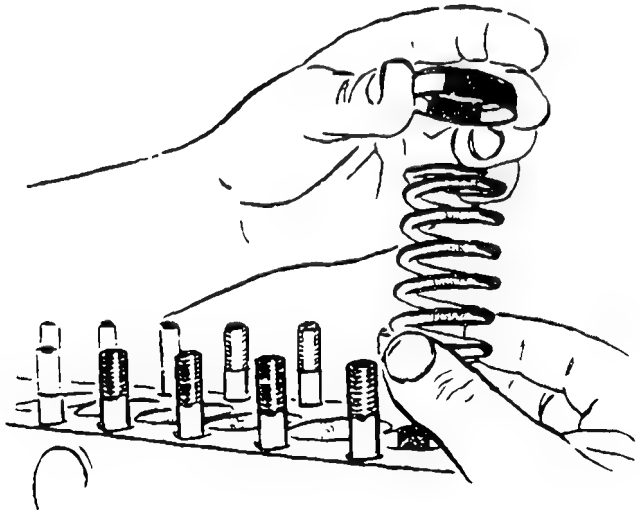
Continue: C18/1

INJECTION PUMP ASSEMBLY

Insert plunger return springs and position upper spring seats on plunger return springs with collar facing plunger return spring.

Continue: C19/1 Fig.: C18/2

KMK02423



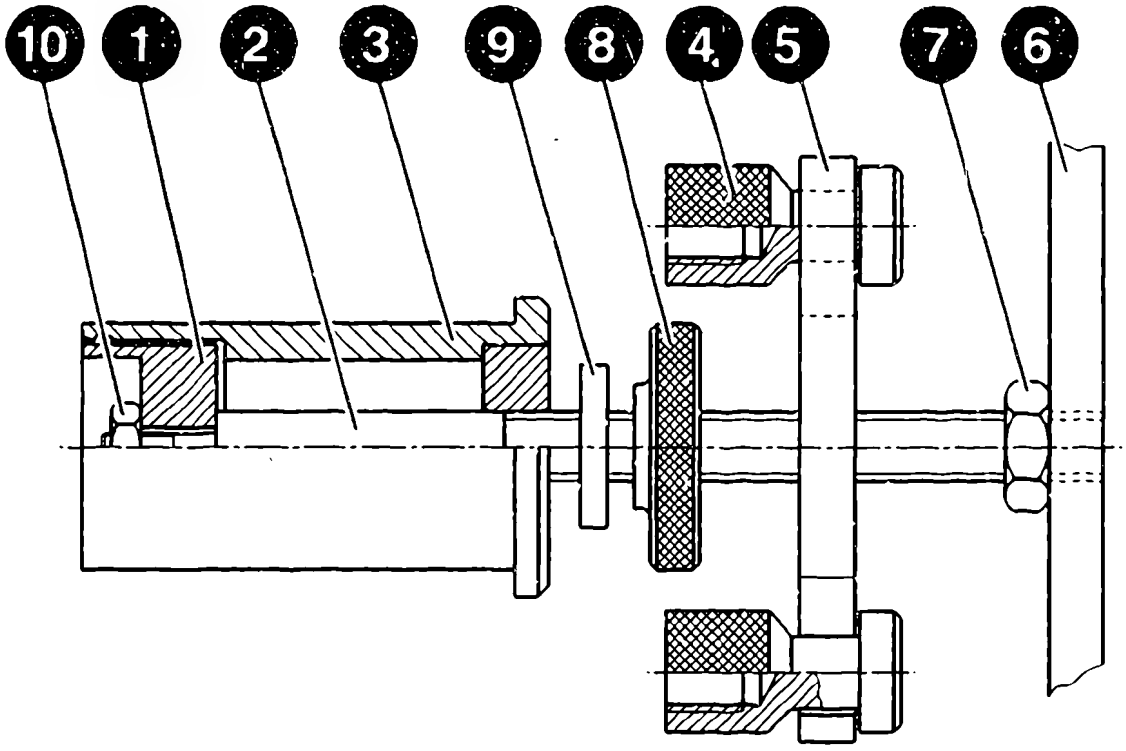
ASSEMBLING INJECTION PUMP

COMPONENT PARTS OF ASSEMBLY TOOL 0 986 612 377 (KDEP 1753):

1 = Holding mandrel
2 = Stem
3 = Sleeve
4 = Retaining pin
5 = Support strip
6 = Handle
7 = Hexagon nut
8 = Knurled nut
9 = Washer
10= Hexagon nut

Continue: C20/1 Fig.: C19/2

KMK02424



ASSEMBLING INJECTION PUMP

Screw retaining pin (item 4) onto threaded pins for attaching assembly. Turn camshaft until appropriate roller tappet is at BDC.

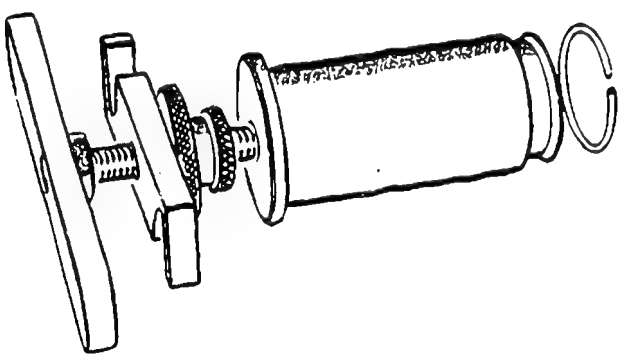
Continue: C21/1

ASSEMBLING INJECTION PUMP

Screw back support strip (item 5) and knurled nut (item 8) of assembly tool 0 986 612 377 (KDEP 1753) on stem (item 2) slightly in direction of handle (item 6). Push back sleeve (item 3) and place snap ring to be inserted over holding mandrel (item 1).
By turning the knurled nut, move sleeve until snap ring is jammed between taper of holding mandrel and sleeve.
Turn support strip on stem until contact is made with knurled nut.

Continue: C22/1 Fig.: C21/2

KMK02425



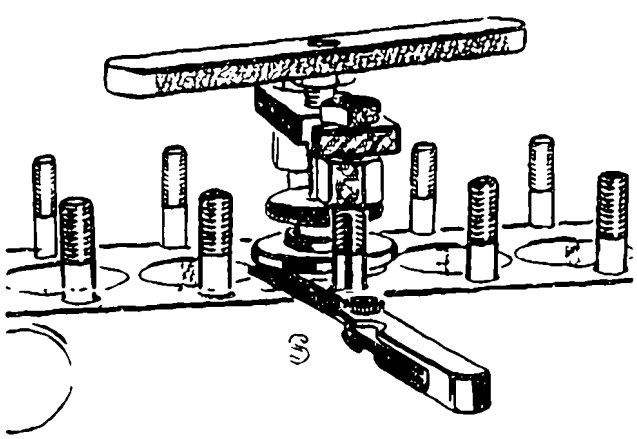
INJECTION PUMP ASSEMBLY

Insert complete assembly device into appropriate hole for plunger-and-barrel assembly in pump housing.

Press down support strip until it can be inserted into ring groove for accommodating support strip at retaining pin. Turn support strip as far as stop at end of slots.
Turn handle until sleeve is pressed into plunger-and-barrel assembly bore. This tensions the plunger return spring and correctly positions the upper spring seat.

Continue: C23/1 Fig.: C22/2

KMK02426



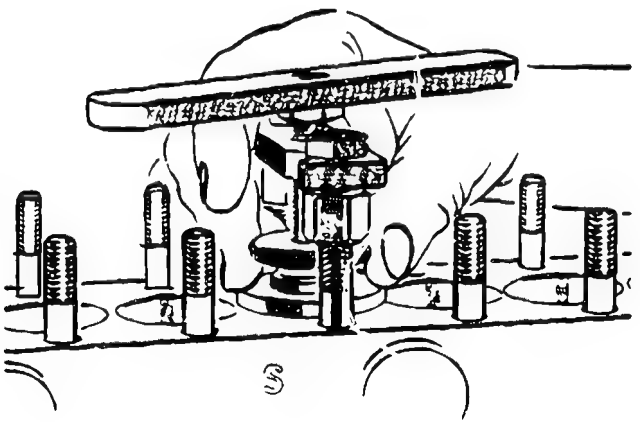
INJECTION PUMP ASSEMBLY

Turn stem of assembly device until distance between stop collar of sleeve and housing is 2 mm (use feeler gauge).

Remove feeler gauge and turn knurled nut down until stop collar of sleeve makes contact with pump housing. This inserts the snap ring in the appropriate groove in the pump housing and the complete assembly device can be removed from the plunger-and-barrel assembly bore by turning the handle upwards.

Continue: C24/1 Fig.: C23/2

KMK02427



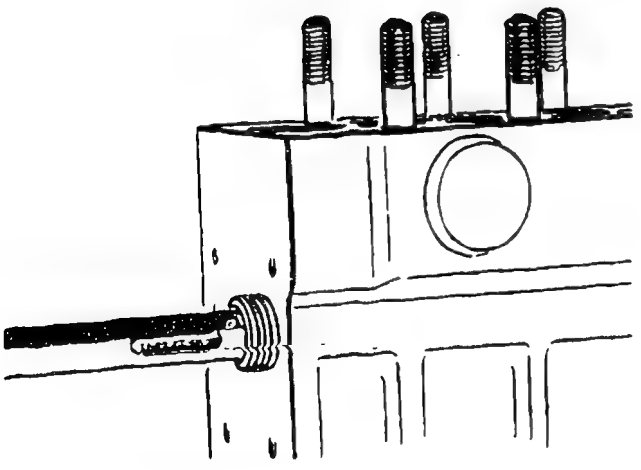
INJECTION PUMP ASSEMBLY

Moisten control rod prior to installation with Molykote Multigliss.

Insert control rod in correct position in hole provided in pump housing such that groove for accommodating control-rod positioning bolt faces outwards. Move control rod until this groove is visible in tapped hole.

Continue: C25/1 Fig.: C24/2

KMK02428



INJECTION PUMP ASSEMBLY

Coat control-rod positioning bolt with Loctite 241, screw into appropriate tapped hole and tighten to 8...11 Nm.

Insert pump plunger from above into roller tappet. In doing so, make sure recess at roller tappet coincides with bottom of plunger.

Continue: C26/1

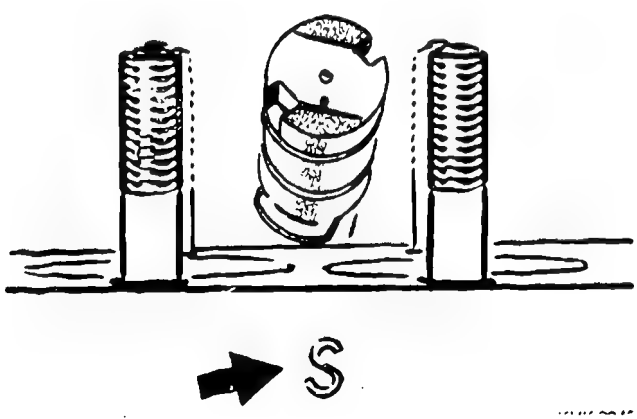
ASSEMBLING INJECTION PUMP

After inserting pump plunger in roller tappet, turn pump plunger through 90 until mark on upper end face of pump plunger is facing back of pump. This is marked by the stamped-on letter "S" (arrow).

Note:
There is NO defined installation position for unmarked pumps.

Continue: C27/1 Fig.: C26/2

KMK02429



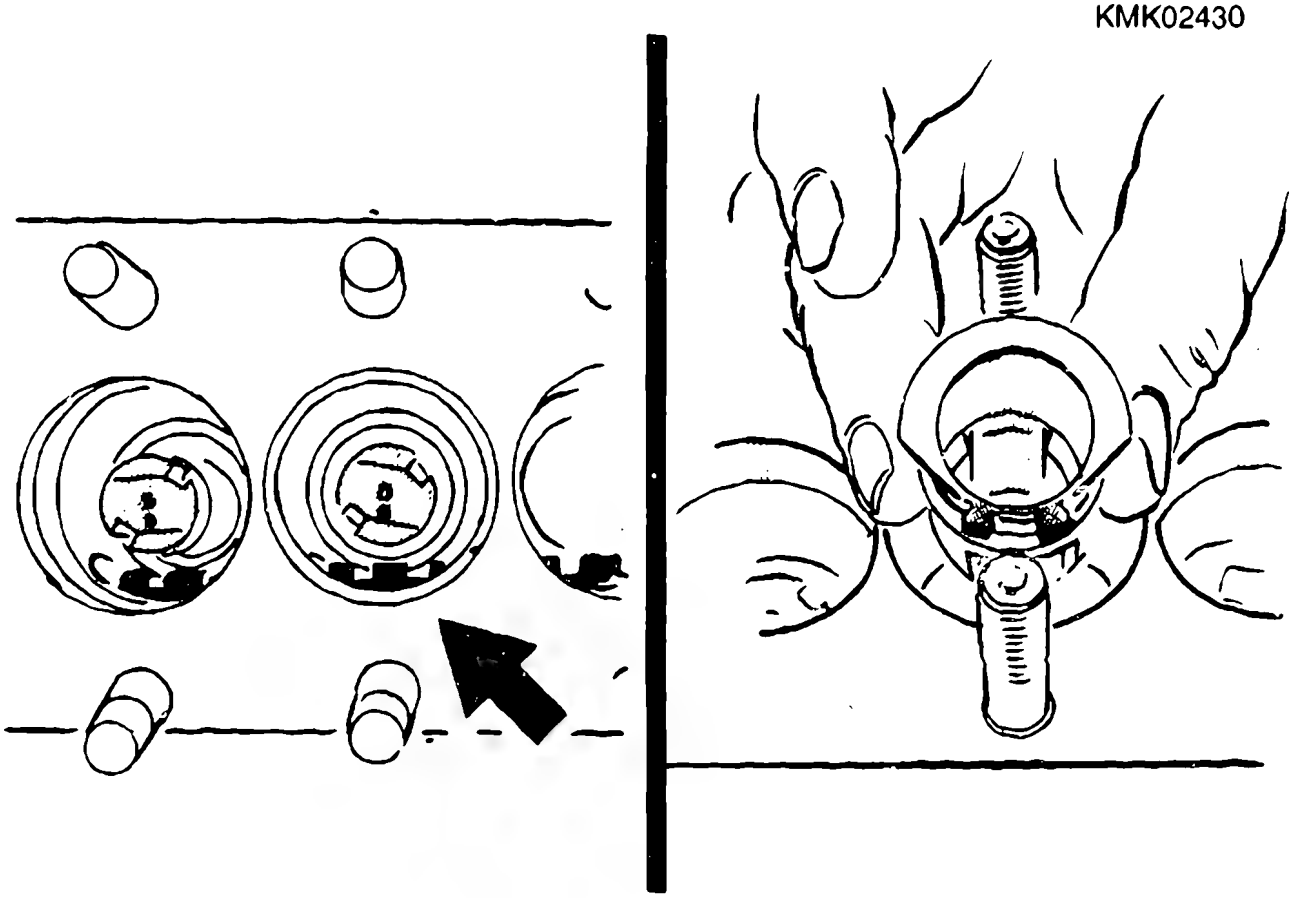
INJECTION PUMP ASSEMBLY

Move control rod until grooves for guiding regulating sleeve are centered (arrow). Insert regulating sleeves. On installation, ensure that the two drive hubs at the regulating sleeves engage in the guide grooves in the control rod.

Given correct installation, the drive hubs are in the bottom half of the control rod. As a visual check, move control rod slightly to left and right. Sticking must not occur.

Continue: C28/1 Fig.: C27/2

KMK02430



INJECTION PUMP ASSEMBLY

Place prestroke shims in pairs on pump housing. It is appropriate to use the prestroke shims together with the plunger-and-barrel assembly to which they were assigned prior to disassembly of the injection pump.

Continue: C28/2

ASSEMBLING INJECTION PUMP

Assembling barrel-and-valve assembly:

Clamp mounting plate 0 986 612 385 (KDEP 1755) in vice. Insert plunger liner into mounting plate hole. Position new soft-iron seal on sealing surface of plunger liner. Place new soft-iron seal on collar of delivery-valve assembly with bead facing downwards. Lubricate seals liberally prior to installation. Insert delivery-valve assembly collar first into plunger liner.

Continue: D01/1

INJECTION PUMP ASSEMBLY

Important: Only use delivery-valve assemblies with finely turned sealing surface on underside. The finely turned surface is absolutely smooth with no scoring. Old delivery-valve assemblies, which are not finely turned, must be scrapped as otherwise the leakproofness of the entire assembly cannot be guaranteed. Insert new O-ring into ring groove in delivery-valve holder. Moisten thread of delivery-valve holder with lubricating oil SAE-30, screw into plunger liner and tighten as follows:

Continue: D02/1

ASSEMBLING INJECTION PUMP

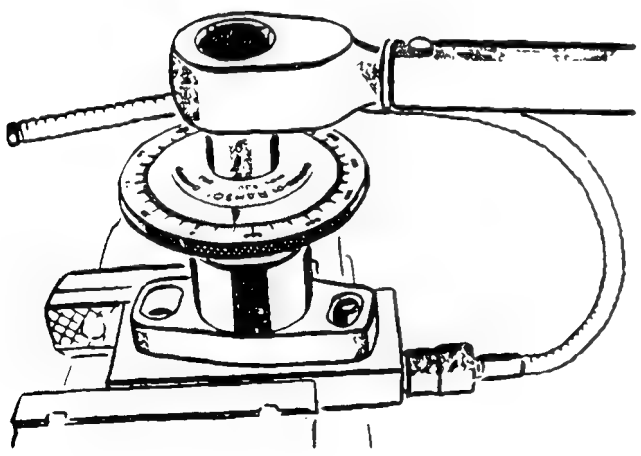
Tightening specification for P10-old (M30x1)

1. Tighten with torque wrench to tightening torque 180...200-0-200-0-38...42 Nm.
2. Continue turning with angle gauge 0 986 612 408 (KDEP 1766) by 20...21.

When performing this operation, set torque wrench to 250 Nm to ensure that this value is not exceeded with the further-turning moment. If this value is exceeded, examine thread of plunger liner and delivery-valve holder and renew damaged parts if necessary.

Continue: D03/1 Fig.: D02/2

KMK02431



ASSEMBLING INJECTION PUMP

Tightening specification for P10-new (M27x1.5)

Tighten with torque wrench to tightening torque 160...180 Nm.

Continue: D04/1

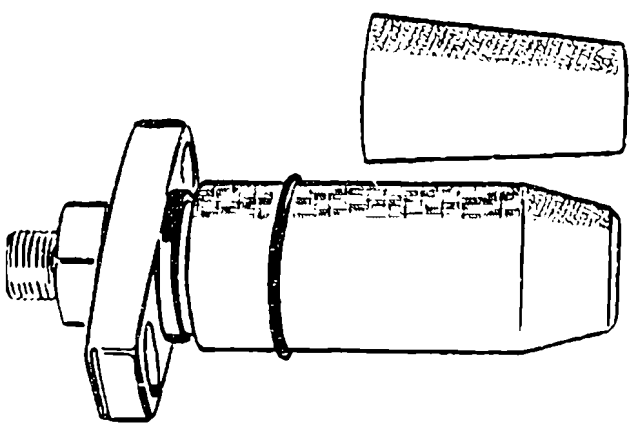
ASSEMBLING INJECTION PUMP

Insert O-rings into grooves provided on plunger liner.

Use is to be made of mounting sleeves 0 986 612 387 (KDEP 1756) and 0 986 612 388 (KDEP 1757) so as not to damage O-rings.

Continue: D05/1 Fig.: D04/2

KMK02432



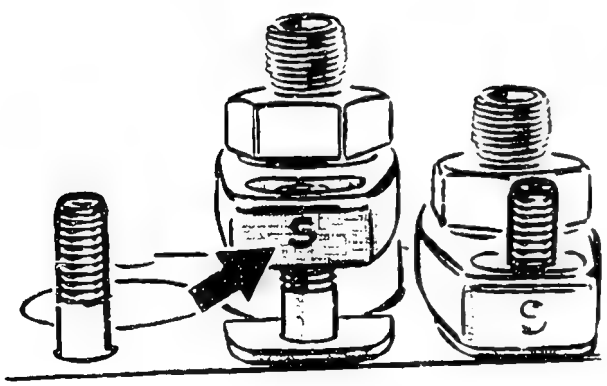
ASSEMBLING INJECTION PUMP

Immerse barrel-and-valve assembly in clean calibrating oil and insert into appropriate housing bore. Make sure stamped letter "S" on assembly flange (arrow) coincides with "S" on pump housing. Press down barrel-and-valve assembly until it makes contact with pre-stroke shims (by way of pressure from above with flat of hand and uniform slight rotation).

Note:
P10-new - No note on installation position "S"

Continue: D06/1 Fig.: D05/2

KMK02433

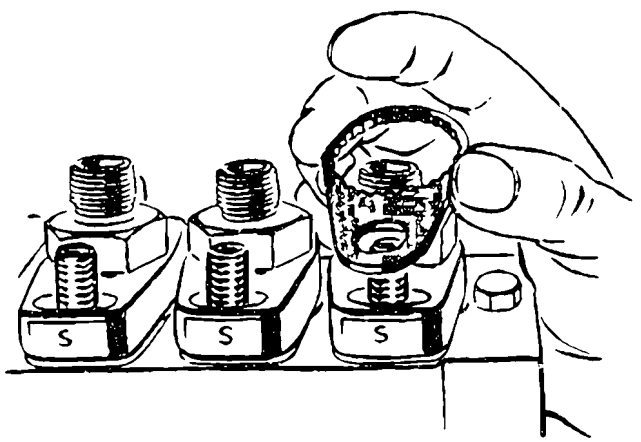


INJECTION PUMP ASSEMBLY

Place positioning key over hexagon of delivery-valve holder and threaded pin. Slip washers under threaded pins and tighten fastening nuts on threaded pins to 51...58 Nm.

Continue: D07/1 Fig.: D06/2

KMK02434

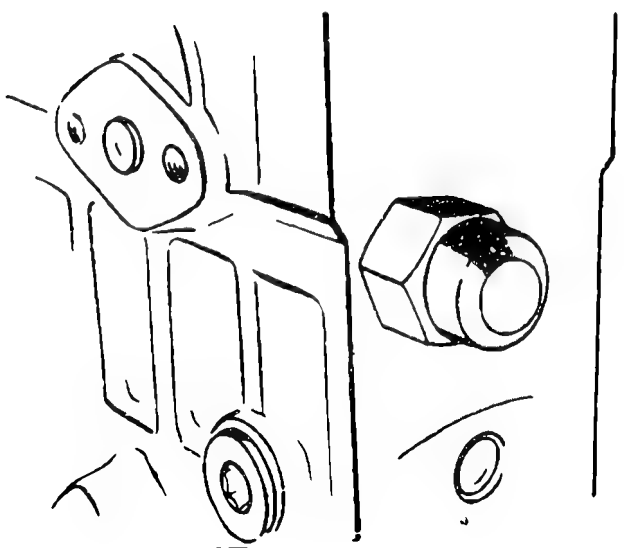


INJECTION PUMP ASSEMBLY

Screw on control-rod closure cap.
Max. tightening torque 30 Nm.

Continue: A01/1 Fig.: D07/2

KMK02435



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EDITORIAL NOTE

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